FIRE MANAGEMENT PRESCRIPTIONS FOR SELWAY-BITTERROOT WILDERNESS ON THE WEST FORK DISTRICT BITTERROOT NATIONAL FOREST REGION ONE

Prepared by W. V. Frost — Date 5-24-78
Fire Management Officer - West Fork RD

Reviewed by Dean A. Byrne — Date 7/6/78
District Ranger - West Fork RD

Robert D. Morgan — Date 7/7/78
Forest Supervisor - Bitterroot NF

Approved by Robert H. Torheim — Date 7/11/78
Regional Forester - Region One

J R

L. C. ROBERTSON
(Acting) STAFF DIRECTOR
FIRE MANAGEMENT

ACKNOWLEDGEMENTS

The efforts and encouragements of many people contributed to this plan. We specifically acknowledge the assistance of Rita Thompson, Dave Aldrich, Bob Mutch, Mick DeZell and Bill Biastoch.

Many thanks to the clerical personnel of the West Fork for their helpful assistance.

TABLE OF CONTENTS

I. SUMMARY

Since 1970 when a change in policy of fire in the Wilderness was made, studies have been done to see what effect fires will have on a wilderness area. Fire has proven to be beneficial to the wilderness land management. It should be noted that because of man's continued suppression of fires over the past years, fuels have been allowed to accumulate to a very unnatural state. These situations could cause more damage to ecological land units than under its previous natural role of fire. The management plan is designed to help reduce these fuel accumulations. This should help the wilderness return to a more natural state.

In writing the fire management plan, the Environmental Statement Fire Management in the Selway-Bitterroot Wilderness - A Proposed Policy Change, was written in 1976 and used as a guideline. The fire management plan was written so that fire management becomes one way of meeting the land management objectives of the wilderness. The plan takes into consideration human life and property, water, soil and air quality, biological life, fuel models, and recreation. The graphs and prescriptions have been made so that the plan can be updated with ease and efficiency as needed.

II. DESCRIPTION

A. Nature of the Proposal

1. Proposal - Proposed is the addition of 137,590 acres of land in the Selway-Bitterroot Wilderness, administered by the Bitterroot National Forest, West Fork Ranger District, to the White Cap Fire Management Area. The purpose is to enlarge the portion of the Selway-Bitterroot Wilderness in which fire, a recognized environmental force, will be permitted to play a more nearly natural role in perpetuating the natural systems it helped form in the Selway-Bitterroot Wilderness. The Wilderness Act of 1964 directs that, in the management of the wilderness resource, natural forces will prevail with the influence of man and his activity minimized. This proposal recognizes that fire is a process influencing the cycling of nutrients, energy flow, plant and animal community composition, species diversity, and the production of biomass in systems in which it occurs.

2. Location and Size (See Map) - The proposed additions are in five zones:

a. Gardiner Creek and North Star Creek drainages (henceforth called the Bad Luck Zone) contains 10,465 acres. This area is contiguous with the west boundary of the White Cap Area. The Selway River forms its south and west boundaries; its north boundary is a ridge which serves as the Bitterroot National Forest - Nez Perce National Forest

boundary. To the north of the Bad Luck Zone, on the Nez Perce National Forest, lies the west portion of the Bear Creek Wilderness Fire Management Area.

b. The Mt. Aura Zone is 29,276 acres and is across the Selway River from the Bad Luck Zone. Its southerly and westerly boundary is the wilderness boundary then along the District boundary between the Nez Perce National Forest and the Bitterroot National Forest.

The major drainages in this zone are Running Creek, Crooked Creek and part of Eagle Creek.

c. The Snake Creek-Indian Creek Zones are 59,375 acres. Its north boundary is the south boundary of the White Cap Area. The Bitterroot Crest (Montana-Idaho State Line) forms the east boundary, and the Selway-Bitterroot Wilderness boundary delineates its southern and western extent. Major drainages in the area are Indian and Canyon Creeks.

The zones are within Idaho County, Idaho.

d. Mt. Jerusalem Zone contains 38,474 acres. It is all on the Montana side contiguous with the Indian Creek Zone. Major drainages are Sheephead, Watchtower, Little West Fork Creek, Soda Springs Creek, Nelson Creek and Boulder Creek.

3. Effective Date - The effective date of implementation pends approval of this proposal by the Regional Forester, and we plan to implement by 1978 Fire Season.

4. Associated Projects - The principal associated projects are operational wilderness fire management plans for the 66,000 acre White Cap Area (West Fork District, Bitterroot National Forest) approved in 1972, and the 67,000 acre Bear Creek Area (Moose Creek District, Nez Perce National Forest) approved in 1974. Much of the methodology and several analytical procedures developed for the White Cap and Bear Creek Areas have been used to formulate management strategy for the proposed areas.

B. Area Description

1. Physical Environment

a. GEOLOGY - Bedrock in this portion of the Selway-Bitterroot Wilderness is principally schist, gneiss and "granitics". Rhyolites are very limited in occurrence. Areas of gneiss are interpreted as inclusions of Belt rocks (deposited some 600 million years ago) that for the most part have been eroded to expose the Batholith.

b. GEOMORPHOLOGY - The portion of the Selway-Bitterroot Wilderness drained by the Selway River is characterized by branching stream patterns associated with the weathering and erosion of homogeneous, non-oriented bedrock. Glaciation was not nearly as extensive in this portion of the Selway-Bitterroot Wilderness as it was along the Bitterroot Front, but glacier-induced features are evident in the eastern portions of the Indian-Canyon area.

c. LAND TYPE AND SOILS - The lands on which the four proposed areas lie are broadly typed as strong cryoplanated mountain slopes - glaciated land. These lands occupy very high glaciated slopes, subdued mountain slopes, and basin, and include areas of very steep breaklands into Canyon and Indian Creeks on the Idaho side. On the Montana side, this would include North Fork of Sheephead Creek, Watchtower Creek, Little West Fork Creek, Soda Springs Creek, and Boulder Creek. Soils are mostly derived from weathered granite and gneiss. Soil characteristics are strongly influenced by the major landforming processes, slope, aspect, moisture regimes, and vegetation. Generally these soils are sandy in texture, well drained and weakly developed. Very shallow soils are common on steep breaklands, and deeper soils occupy the more subdued upper slopes.

d. CLIMATE - Prescription and temperature in this part of the Selway-Bitterroot Wilderness are both strongly influenced by the Bitterroot Mountains. Average annual precipitation varies with elevation and relative topography. Normal 1/ amounts of precipitation range from about 27 inches at North Star Ranch (elevation 2800 feet) to 90+ inches along the Bitterroot Crest. Less than half of the precipitation along the Selway River falls as snow; by contrast, snow accounts for about 75 percent of the precipitation in the high country. July and August precipitation is frequently associated with thunderstorms, though lightning activity is not confined to the July-August period. Ref. Climate of the Selway-Bitterroot Wilderness by Finklin, Oct. 1977.

III. ENVIRONMENTAL EFFECTS

Because of inherent and significant differences between them, the fire management zones under consideration will be discussed separately in the following analysis.

1/ Based on or adjusted to the standard period 1941-1970.

Environmental effects will be discussed relative to systems rather than to discrete elements of the wilderness resource. This approach is taken to emphasize the wholism operative in wilderness and the philosophy that wilderness management has as its objective the perpetuation of natural systems functioning in harmony with their total environment.

1. Biotic Environment

a. VEGETATION - The communities of plants that develop in a given area are expressions of the flora of the area acted upon by elements of the physical environment. Vegetation, and other environmental components, can be stratified any number of ways depending on the purpose of stratification. The environment of the four proposed fire management areas has been stratified for fire management purposes into ecological land units (ELU's). The parameters used in defining an ELU were those affecting the role of fire--existing and potential vegetation, fuels, slope, aspect, and fire history to the extent it could be determined.

1) ELU Descriptions - ELU's have been defined for the seven zones (See Map). Any ELU will encompass some variability; however, within an ELU there are strong and consistent differences. The ELU's have been converted to fuel models and can be found in the ELU - Fuel Model Conversion Chart (see Appendix A).

a. Shrubfield (fuel model H) - The shrubfield ELU is the Bad Luck Zone. It is a continuation of the shrubfield in Bad Luck drainage (westernmost drainage in White Cap.)

The shrubfield ELU is characterized by seral communities composed of shrubs with herbaceous species in the understory. The potential vegetation on the unit is probably Douglas-fir/ninebark (DF/Phma) up to about 6,000 feet, alpine fir/beargrass (AF/Xete) on southerly aspects above 6,000 feet. The present shrub communities are the result of multiple, short-interval, high intensity fires prior to 1919, a high intensity fire in 1919, and some evidence of repeats in 1934 and 1940. As illustrated by Lieberg (1900), in some situations a fire can establish potential for another fire within a short time. A fire can kill many of the trees on an area, leading to shrub release and/or establishment and tree regeneration. Several years later, when some of the dead trees shed parts or fall to the ground in their entirety, and the understory has provided ground fuels, a second fire can occur. This second fire, fed by a variety of fuels--shrub litter, fines, conifer regeneration, dried large fuels--can effect elimination of heavy fuel loads, much of the reproduction, and much of the conifer seed source.

In the shrubfield ELU conifers are present as individuals, groups, or entire stands. The best conifer development occurs along creek bottoms and in draws. Species present are Douglas-fir, lodgepole pine, and some ponderosa pine. The typical shrub community is best developed on south and west aspects on droughty sites.

Fuel components in the shrubfield exhibit considerable variability. Aerial fuels are almost absent. Fuel appraisal plots indicate relatively light loading of small diameter branchwood (1.6 cm diameter) and heavy loading of dead brush, both of which contribute to a moderate rate of spread. There is a moderate loading (but patch distribution) of large, rotten, down fuels which indicates a potential for fire persistence and spotting, in critical weather conditions, such as a red flag day.

Much of the information for the Bad Luck Zone shrubfield ELU was extrapolated from the shrubfield ELU in the old Bad Luck Area, verified by on-the-ground observations and helicopter reconnaissance.

b. Ponderosa pine-Douglas-fir (fuel model C) - This ELU is represented on south facing slopes into Cooper, Canyon and Indian Creeks in the proposed Snake Creek-Indian Creek Zones. It extends from just above stream bottom to about 6,000 feet. Up to about 5,000 feet, the ELU occurs primarily on breakland and fluvial landforms having shallow, permeable, coarse-grained soils on steep (60-80%) slopes. From about 5,000 to 6,000 feet the unit is on more moderate (40-60%) slopes on a cryoplanated landforms. Soils are a bit deeper on this bench, and not as droughty as on the breaks. The unit extends above 6,000 feet on warm, dry ridges.

The principle cover type on this ELU is ponderosa pine, which has the position of a major seral species. Field examination revealed that the age distribution of ponderosa pine communities is skewed to the older age classes with most stands in the 150-300 year old range. Ponderosa pine regeneration is generally confined to sites where there has been some disturbance, mostly attributable to past fires.

Douglas-fir is found throughout the ELU, represented by old (100-200 years) and young (less than 50 years) stands. Douglas-fir reproduction in the 30 year old class is prevalent under mature overstories. Lodgepole pine is represented as a seral species at the unit's upper elevational limits. The ELU has a well developed but discontinuous shrub layer, and a variety of grasses and forbs represented.

The DF/Phma habitat type is characteristic of the ELU, with inclusions of the following: ponderosa pine/Idaho fescue (PP/Feid) on the steepest, droughtiest sites; Douglas-fir/ snowberry (DF/Syal) and DF/Bearberry (DF/Aruv) on dry, rocky ridgetops. At the unit's upper elevational limit, DF/Xete is the principal habitat type.

Field examination indicates that the vegetation on this ELU evolved under the influence of frequent, relatively low intensity fires. The uniform, continuous fuels now present are suspected attributable to fire suppression actions. Fire occurring at frequent intervals will control buildup of grass and needle litter and some reproduction. The ponderosa pine-Douglas-fir ELU is relatively productive. As time between fires increases, quantities of small fuels accumulate. The short vertical distance between ground fuels and crowns of Douglas-fir regeneration presents a potential crown fire situation. The fire spread model indicates potential for high intensity fires in this unit.

c. North Slope communities (fuel model G) - This ELU occurs on north aspects into Cooper, Canyon and Indian Creeks. It extends from stream bottom up to about 6,000 feet. Land forms associated with this ELU are influenced by frost churning and glaciation. Soils are generally deep, coarse textured, and well drained; a thin loess cap occurs locally. Steep topography is characteristic, with slopes up to 100 percent. Some rock outcrops occur, but the generally deep soil development permits nearly continuous forest cover.

This ELU is floristically diverse: relatively warm, moist conditions provide habitat for many elements of the Pacific Coast flora. Habitat types reflect environmental gradients. Adjacent to major streams some cedar type occurs, grading to grand-fir/queencup beadlily (GF/Clun) - beadlily phase. At midslope (4,500-5,000 feet) GF/Clun beargrass phase reflects drier conditions. From about 5,000 to 5,500 or 6,000 feet,

the GF/beargrass (FG/Xete) habitat type is encountered. The alpine fir series occurs from about 5,500 to 6,000 feet, represented by AF/Clun, AF/Menziesia (AF/Mefe), and AF/woodrush (AF/Luhi) types.

Fuel loadings are heavy in this ELU, reflecting a combination of high site productivity and a long fire cycle (100-250 years). Stands in this ELU are relatively young, averaging 100-150 years. In many stands "jackpot" fuel situations are scarce. However, throughout the unit there are small areas where age and/or biological agents have caused stand deterioration.

The role of fire has been significant in north slope communities. With inherent high productivity and long fire cycles, fires are often high intensity fires that effect stand replacement. Low intensity ground fires can also occur in this ELU, however.

d. Subalpine (fuel model H) - This ELU is continuous with the subalpine ELU in the Upper White Cap Zone, Mt. Jerusalem and portions of Snake Creek Zone, extending around the heads of Canyon and Cooper Creeks along the Bitterroot Crest, including the wilderness portion on the Montana side, the heads of Sheephead Creek, Watchtower Creek, Little West Fork Creek, Soda Springs Creek and Boulder Creek. Fire occurrence records show that over the past 40 years only seven fires have occurred in this area. The unit encompasses high elevation areas where plant growth is affected by a cool climate and short growing season. Vegetation, and therefore fuels, also, are discontinuous due to extensive rock outcrops, snow slides, cliffs, cirque walls and basins, lakes, etc. With increasing elevation, soils become poorly developed. The ELU extends from about 6,000 feet to above timberline.

On south aspects in this ELU, the climax dominant up to about 6,500 feet is Douglas-fir. The species has a seral role at higher elevations. Above 6,500 feet alpine fir is the expected climax dominant, associated with spruce on moister microsites. Lodgepole pine is a major seral species; whitebark pine occurs at timberline. The understory is relatively simple, composed of beargrass, huckleberry, grouse whortleberry, forbs, sedges, and grasses. Moisture generally becomes limited productivity, fuel accumulations are lighter than found on more productive

north aspects counterparts of this ELU. Significant accumulations of continuous fuels do occur on sites where biological agents have contributed to the physical deterioration of lodgepole pine stands.

On north aspects, alpine fir and Engelmann spruce are the climax dominants with lodgepole pine an important seral element. Alpine larch grows along the rugged ridges of the Bitterroot Crest, and whitebark pine occurs at timberline. Moisture is not limiting on north aspects; sites are generally wet the year around, and permit the development of dense brushy understories. While fuel accumulations are heavy, dry weather, deteriorating stands and/or sufficient preheating are necessary for a spreading fire.

Fire frequency in this ELU is on a cycle of about 100-250 years with the longer cycle more typical of the moister north aspects. Stand investigations show that fires from the ponderosa pine-Douglas-fir ELU often burn into south aspect portions of this ELU. Small average spot fires are common in this unit. Large, high intensity, long duration stand replacement fires can occur in deteriorating lodgepole pine stands -- the type of fire that permitted their development in the first.

e. Lodgepole Pine (fuel model G) - This is a "new" ELU, which has no counterpart in either the Upper White Cap Zone or Bear Creek areas. It occurs on either side of the ridge between White Cap and Indian Creek at an elevational range from 5,500 to 7,000 feet. Topographic features are the result of centuries of frost churning and subsequent action of running water. Slopes generally range from level to 40 percent, and are commonly 25 percent or less on ridgetops. Sideslopes into draws and creeks are steep, commonly 70 percent or more. Soil development is generally good throughout the ELU, though there are occasional rock outcrops. Soils are drived from granitic materials; they are coarse-grained, non-plastic, and well drained.

Large stands of lodgepole pine occur throughout the ELU on all aspects. Seral and climax Douglas-fir stands occur on the ridges and warmer slopes at lower elevations in the unit. Spruce and spruce-subalpine fir stands are present on some of the more moist north slopes; past disturbances generally have prevented later successional stages from developing

southerly aspects. Stands tend to be large (tens to hundreds of acres) and even aged, or to have developed from even-aged seral stands. Stands on south aspects are generally 60 to 100 years old; north aspect stands range to over 200 years old.

Douglas-fir habitat types occur at the lower elevational reaches of the ELU: DF/pinegrass (DF/Caru) in areas of AF/Xete and AF/Grouse whortleberry (AF/Vasc) occur on mid-southerly aspects up to about 6,500 feet. Above this elevation on south aspects, AF/Luhi - vasc phase occurs. AF/Mefe habitat type occurs on the moist northerly aspects between 6,000 to 6,500 feet. Above 6,500 feet on north aspects the principal habitat type is AF/Luhi-Mefi phase.

Lodgepole pine usually establishes after fires on north-facing slopes. Subalpine fir and spruce become established later under the lodgepole. By the time lodgepole stand is 100-120 years old, it begins to succumb to insects, disease and competition. By age 300, only a few lodgepole pines remain in the stand, whose dominants are subalpine fir-spruce.

On south aspects, post fire stands either can be Douglas-fir, lodgepole pine or mixed. There are some old-aged pure stands of Douglas-fir in the ELU. On subalpine fir habitat types on south slopes, subalpine fir currently occurs in seedling and sapling stages.

The classic fire in this ELU is the infrequent, high intensity fire that results in stand replacement. Such fires typically occur at 75 to 100 year intervals on south aspects, and at 100-200 year intervals on north aspects. Differences in frequency relative to aspect are attributable to:

- Southerly aspects are hotter and fuels dry and remain dry longer than on north aspects, permitting ignition and faster spread.

- The ponderosa pine-Douglas-fir communities, which burn on relatively short cycles, are just below the south aspect portion of this ELU. Fires often spread to this ELU from this lower zone.

At the other end of the fire intensity scale, small ground fires frequently occur in this ELU. These fires are usually suppressed at very small sizes; if suppression action were not taken, some would probably burn to larger sizes. Intermediate between high and low intensity fires, there are numerous moderate intensity fires that burn small acreages.

The major understory species in this ELU (Pinegrass, beargrass, thinleaf huckleberry, grouse whortleberry, and menziesia) are well adapted to fire, and are capable of resprouting from underground parts. Extremely intense fires, however, can kill any plant. Fire, therefore, may significantly change overstories but has little affect on understory composition. Lodgepole pine can be expected to regenerate on any of the habitat types following fire. On lower, warmer south slopes, Douglas-fir can form seral stands, either pure or mixed with lodgepole pine.

2) Endangered and Threatened Plant Species. The revised list of endangered and threatened plant species (Federal Register, June 16, 1976) includes the following species for Idaho County, Idaho:

- Dasynotus daubermirei - Forest opening, mid to high elevation mountains. Endangered.

- Cardamine constancei - Moist woods along the Selway and Clearwater Rivers. Endangered.

a. Wildlife - The Bad Luck and portions of Mt. Aura Zone is now a shrubfield as a result of fires in the 1900's. It is a major wintering area for elk and white tail and mule deer. The Snake Creek and Indian Creek Zones do not contain as large or important a wintering area, but sizeable populations of elk and white tail and mule deer inhabit the drainage yearlong. A population of Rocky Mountain goats inhabit this area.

A few Rocky Mountain bighorn sheep winter in Indian Creek, and a major population of sheep moves through the area in migration from winter ranges along the Selway River Breaks to summer ranges in the high basins along the Bitterroot Crest in Montana. See Appendix E.

The proposed areas provide habitat for the usual implement of large predators (black bear, mountain lion), smaller mammals (pine marten, wolverine, bobcat, Canada lynx) and birds.

There are no known populations of endangered or threatened animal species in the area.

b. Watershed and Fisheries - Most streams and lakes within the fire management unit have good water quality for wildlife and fisheries. The streams have stable channel conditions.

Most streams and lakes have limited aquatic plants and animal life. Fishing could be rated average. The Clearwater River drainage, of which the Selway is part, is important nationally for its anadromous fishery. The Idaho Fish and Game stated that there would be no problem with the fisheries in the Selway River area. (See Appendix G)

3) Historic and Archaeological Features. The National Register of Historic Places has been consulted and no sites are listed in any of the proposed areas.

Homesteads at the mouth of North Star Creek and Running Creek are still inhabited, and appear on the Selway-Bitterroot Wilderness map. There is a homestead site at Cooper's Flat, but no structure remains from its first inhabitants. The Forest Service currently maintains a cabin at Cooper's Flat. The cabin is not considered to be historically significant.

4) Uses of the Selway-Bitterroot Wilderness. Big game hunting continues to be the major recreational activity in the seven proposed fire management zones.

Five licensed outfitters operate on the Magruder portion of the Selway-Bitterroot Wilderness. Two of them operate out of their ranches at North Star and Running Creek on the Selway River. Many private hunting parties use the area also. Two licensed outfitters operate on West Fork side of the Selway-Bitterroot Wilderness.

Float trips down the Selway River accounted for approximately 1600 use days in 1977. Hiking and backpacking are growing in popularity year by year. Hikers frequently engage in other activities such as photography, plant study and bird watching. There are approximately

165 miles of wilderness trails in the Bad Luck Zone and Snake Creek-Indian Creek Zones. Paradise, Boulder Creek, and Tin Cup Creek portal registrations at trail heads, provide access to the White Cap. Additional access points, trail take-offs, exits are at Deep Creek, Wynn Creek, Cayuse, Nez Perce Pass, Sheephead and Watchtower. Access to these portions of the Selway-Bitterroot Wilderness is facilitated by the Nez Perce Road No. 468, from Nez Perce Pass down Deep Creek to Magruder, and on down the Selway River to Paradise Guard Station. There is a private air strip at North Star Ranch, and one at Running Creek Ranch across the Selway River. (See Appendix)

MANAGEMENT REQUIREMENTS AND CONSTRAINTS
MANAGEMENT ASSUMPTIONS AND PRESCRIPTIONS

1. Basic Assumptions

Assumptions stated are the objectives, policies, and principles to be applied to the project area in preparation of the fire management prescriptions that follow:

a. The fire management prescriptions for the Indian Creek, Snake Creek, Bad Luck, Mt. Jerusalem and Mt. Aura Zones are compatible with the goal of perpetuating the concept of unmodified ecosystems in wilderness and will consider adjacent land management goals outside wilderness.

b. A very active prevention program will be used and man caused fire will be suppressed.

c. Fires or portions of fires will be suppressed to protect human life and property.

d. Contain fires within wilderness boundaries unless as approved and compatible fire management plan exists adjacent to the wilderness.

e. Prescribed burning in wilderness will not be used at this time.

f. Coordination on all fires detected within the fire management units will be from the Ranger District to the Supervisor's Office. The SO will coordinate with neighboring forests, RO and WO.

g. Lightning causes approximately 99% of our fires in these units.

h. The I&I PLAN will be ongoing. This will involve inservice personnel as well as necessary public contacts. We will inform the private landowners on the Selway River.

i. Line Officer decision responsibility will be the District Ranger and/or Fire Management Officer if the prescription calls for monitoring. District Ranger is responsible for all fires that call for immediate suppression. The Regional Forester, Forest Supervisor, and District Ranger retain the authority to suppress any fire.

j. This plan will be reviewed and adjusted, as needed, at the end of each fire season.

V. FIRE MANAGEMENT PLAN

A. Development of Fire Management Zones

1. Rationale for Development:

Wilderness fire management in the Selway-Bitterroot Wilderness began with approval of the Bitterroot National Forest's White Cap Fire Management Plan in 1972. Fire management zones within the 66,000 acre White Cap Area were established primarily according to ELU boundaries; prescriptions for management zones reflected specific conditions within an ELU, such as fuels, possible control points, proximity to the area boundary, etc.

The White Cap area has experienced 17 fires from 1972 to 1977. In 1973, the Fitz Creek fire burned 1200 acres and adjacent to the study area the Snake Creek fire burned 1680 acres. These two fires and the other 15 fires have provided data for evaluation. This data has been incorporated into this larger fire management plan.

In 1974, the Nez Perce National Forest's Bear Creek Fire Management Plan was approved. The Bear Creek Area, about 60,000 acres, lies north of, and adjacent to, the White Cap Area. An Environmental Impact Statement was adopted for the entire Selway-Bitterroot Wilderness for fire management in 1976. The fire management zones and prescriptions were developed from the EIS and using some of the same guidelines for the White Cap Study area.

The proposed Bad Luck Zone is contiguous with the west boundary for the Upper White Cap Zone and the westernmost segment of the south boundary of the Bear Creek area. The proposed Snake Creek and Indian Creek Zone is contiguous with the southern boundary of the Lower and Upper White Cap Zones. The Mt. Jerusalem Zone is contiguous to the south and east of Snake Creek and Indian Creek Zone, all on the Montana side. The Mt. Aura Zone is across the Selway River from the Bad Luck Zone. It encompasses the rest of the Selway-Bitterroot Wilderness on the West Fork District. The combined proposed addition is 137,590 contiguous acres, for a total of 203,590 acres.

Several factors suggested the desirability to depart from the procedure of developing fire management zones along ELU boundaries for the seven proposed zones.

- The fact that the proposed zones are contiguous with the Lower and Upper White Cap Zones eliminates the need for restrictive prescriptions developed out of the need to contain fires within the White Cap's south and west boundaries.

- Fire management zones should have boundaries that are readily identifiable on the ground. Further, they should have defensible boundaries from a fire suppression standpoint. This becomes increasingly important as size of the area under fire management increases. ELU boundaries are not always distinct on the ground; an ELU, even though it might be distinct, may be too small to feasibly be considered a prescription unit.

For these reasons, ELU's have been combined to form identifiable, feasible and defensible, fire management zones for the combined Lower and Upper White Cap, Bad Luck, Snake Creek, Indian Creek, Mt. Jerusalem and Mt. Aura Fire Management Zones. (See Map).

I. FIRE MANAGEMENT PRESCRIPTION

The Selway-Bitterroot Wilderness on the West Fork District consists of 203,590 acres. The unit ranges in elevation from approximately 2,700 feet to 10,153 feet and has a variety of terrain. Many different plant and animal communities are found in this unit. The Nez Perce National Forest, Magruder Corridor, Lower West Fork Planning Unit and the Darby District border this unit. There are two small homesteads on the Selway River.

The zones are divided into fuel models "C", "G", and "H". Descriptions of the fuel models are in National Fire Danger Rating System - 1978. (See Appendix C).

Graphs were developed using the fuel model, Energy Release Component (ERC) in relation to the Region Level of Preparedness and the time of year. Because of the variety of microclimates and range in elevation, several graphs were developed to fit the various zones. Each prescription will refer you to the graph and fuel model to be used for each fire. The graphs will be called the ERC Graphs.

The ERC Graph furnishes guidelines for observation or suppression and is called for in accordance with each fire prescription.

Suppression of fires is indicated and will be considered in all the following situations:

1. When human life or private property is threatened by fire.
2. When fire is threatening areas outside of the management unit.
3. When air quality problems are affecting the airshed near or over population areas.
4. When multiple fire starts may require suppression of individual or all fires.
5. When fires will continue burning into the fire season (July 1 through August 25) and the season is predicted to be critical.

A prescription is written for each zone. Fuel models within each zone are used separately or together depending upon the zone fires are managed in accordance with the prescription. For ease in determining monitoring or suppression, a flow chart has been made.

Mt. Aura Zone:

The zone consists of fuel models "H" and "G". Fires will be managed in accordance with fuel model and ERC Graphs.

In fuel model H area, fires that would threaten the Running Creek Ranch and/or the North Star Ranch will be suppressed.

Fires in fuel model "G" will be managed as ERC Graph indicates. All fires threatening wilderness boundary will be suppressed or portions of the fire will be suppressed.

Bad Luck Zone:

This zone contains fuel model "H". Fires within this zone will be managed as the ERC Graph H indicates. In addition, fire may be suppressed to prevent loss of large areas of winter game habitat. Fires threatening the North Star Ranch will be suppressed.

Upper White Cap Zone:

This zone contains three fuel models, each are "C", "G" and "H". In fuel models "C" and "G" there are heavy fuel accumulations. All fires burning in this zone in pre- and post-fire season will be allowed to burn according to management prescriptions. Fires will be managed in accordance with the ERC Graph and fuel model indication.

Lower White Cap Zone

The zone is Fuel Model "C". Fires will be managed as the ERC Graph indicates. Fires threatening zone boundaries will be managed in accordance to the zone it will be entering. Fires threatening Management Plan boundaries will be suppressed on portions of the fire.

Snake Creek Zone

This zone consists of fuel models "C", "G" and "H". All fires will be managed in this area using the ERC Graph and fuel model.

Indian Creek Zone

The zone contains fuel models "C" and "G". Fires will be managed in this area using the ERC Graph and fuel model. Fires entering different fuel models or zones will be managed as the ERC Graph and fuel model indicates for that area. Fires threatening the wilderness boundary will be suppressed or portions of the fire.

Mt. Jerusalem Zone:

This zone contains fuel models "G" and "H". Fires in fuel model "G" will be managed as ERC Graph indicates. Fires threatening the wilderness boundary will be suppressed or portions of the fire.

FIRE MONITORING IN THE FIRE MANAGEMENT UNIT WILL BE BY FIRE QUALIFIED PERSONNEL UNDER THE FOLLOWING GUIDELINES:

OBSERVATION SITUATION

DATE	E.R.C. PERCENTILE	OBSERVER QUALIFICATION
A. May 1 - June 25	Up to 80% Above 80%	Aerial observer or crew boss Crew boss
B. June 25 - August 25	Up to 80% Above 80%	Aerial observer or crew boss FMO, District Ranger or Intelligence Officer
C. August 25 - October 31	Up to 80% Above 80%	Aerial observer or crew boss Crew boss

The following visual observation will be made:

1. Location and fire behavior.
2. Determine the presence of any Forest user in immediate area.
3. Fill out Fire Management Plan Daily Fire Observation Report (Refer to Appendix D).
4. Report on the Daily situation will be made of each going fire. Records will be kept on file for three years.
5. Reports are to be turned in to the West Fork Ranger Station dispatcher.

VII. PUBLIC RELATIONS AND SAFETY

Public relations within the fire management area is very important. It should be noted that the public uses of the unit are for fishing, hunting, hiking, backpacking, horseback riding, rock climbing and floating. People can be found throughout the management area. In order to reach as many of the wilderness users as possible, a sign plan will be adopted at every major entry to the Fire Management area.

Possible ideas that could be used to convey the fire management plan to the wilderness user are as follows:

1. The benefits of wilderness fire management.
2. Safety policies for the public.
3. Use of media and meetings with the public.
4. Emphasis on human life and property protection.
5. In-service training of Forest Service personnel.

Outfitters and landowners are to be notified of fire management policy within this area. Great care should be taken to explain the plan to them so that they, too, understand our goals and help us in explaining it to their guests.

A plan of action towards a situation has been considered when people are in the area of the fire. Some considerations are listed below:

1. Locating people in the area by aircraft.
2. Ground contact with the people.
3. Make sure they are in a safe area.
4. Arrangements for evacuation of life and property.
5. Possible closure of zone or zones.

III. COSTS VS. BENEFITS

Though it is easy to tabulate costs of observations and/or suppression of a fire as it is weighed in material items and wages, the benefits derived from the wildlife are hard to measure in dollars. It can best be determined by how much good it's

doing for resources and prevention of maybe more and/or larger fires in the future. The benefits can be found to be both short and long term. It is going to be awhile in the future before we can come up with a method of measuring benefits. But all this data that can be obtained from the fires should be kept on record for future analysis.

Data that should be gathered for future studies is listed below:

1. Cost of observation.
2. Cost of suppression.
3. Positive resource values.
4. Possible reduction of fires in future.
5. Negative resource values.

PRESCRIPTION TABLE

FUEL MODEL	DATE	E.R.C.	OBSERVATION	SUPPRESS INDICATI
C	5/1-6/25	<12	X	
		>11		X
	6/26-8/25	<18	X	
		>17		X
	8/26-10/31	<17	X	
		>16		X
G	5/1-6/25	<30	X	
		>29		X
	6/26-8/25	<49	X	
		>48		X
	8/26-10/31	<40	X	
		>39		X
H	5/1-6/25	<16	X	
		>15		X
	6/26-8/25	<28	X	
		>27		X
	8/26 10/31	<23	X	
		>22		X

MANAGEMENT PLAN
CONSIDERATIONS FOR SUPPRESSION

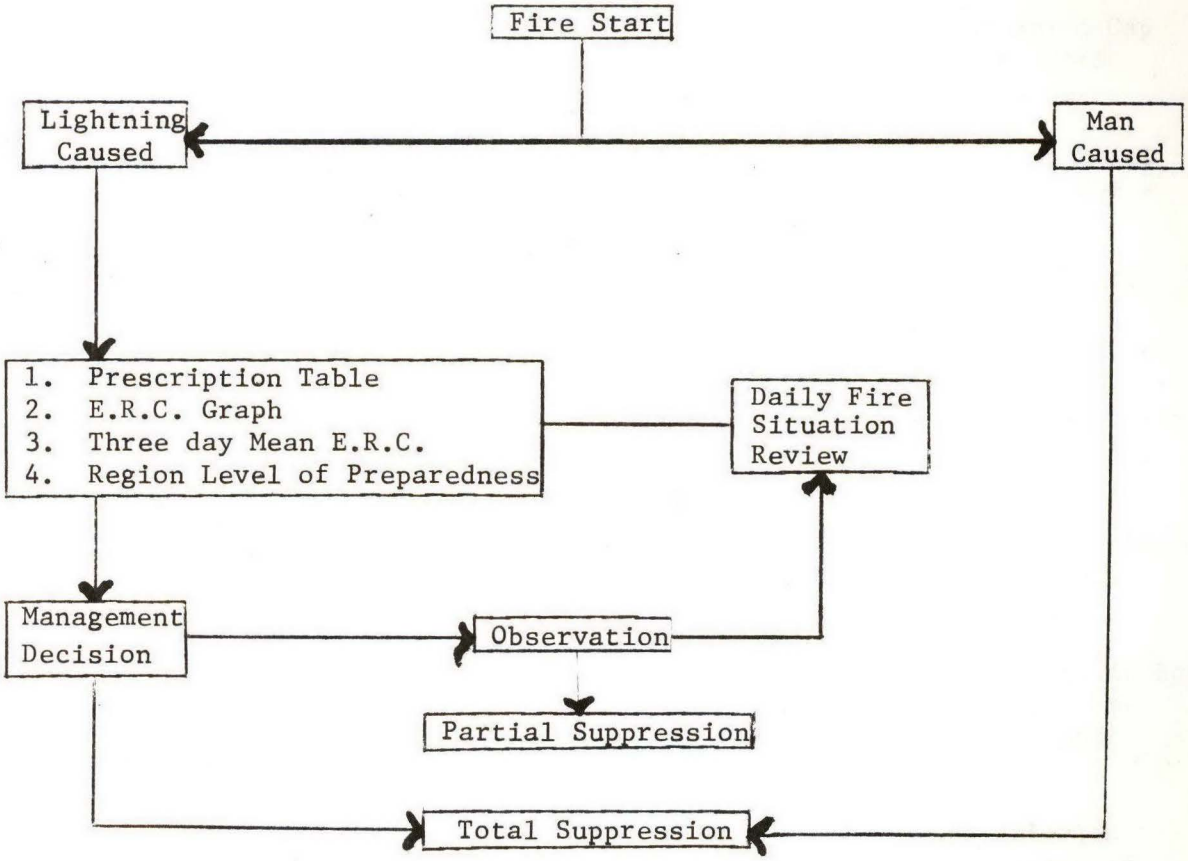
1. Fire threatening wilderness boundary
2. Fire threatening privately owned lan (e.g. North Star and Running Creek)
3. Fire threatening areas within wilder but outside the management area
4. When human life or property is threa by fire
5. When fire would tend to degrade air quality beyond acceptable levels
6. When multible fire starts may requi suppression of individual or all fi
7. When fires will continue to burn in the fire season (June 25 - August 2
8. Fires entering different fuel model or zones will be managed as the E.R graph and fuel model indicates for those areas
9. Forest and Regional fire suppressio preparedness levels

NOTE: PARTIAL SUPPRESSION MAY BE CONSI AS AN ALTERNATIVE TO TOTAL SUPPR

SUPPRESSION REQUIRED

1. Man-caused fires

Flow Chart


Fire Start
Lightning Caused
Man Caused
1. Prescription Table
2. E.R.C. Graph
3. Three day Mean E.R.C.
4. Region Level of Preparedness
Daily Fire Situation Review
Management Decision
Observation
Partial Suppression
Total Suppression

BIBLIOGRAPHY

Aldrich, David F. & Mutch, Robert W. 1973 — Ecological Interpretations of White Cap Drainage-A Basis for Wilderness Fire Management. USDA - Forest Service

Aldrich, David F. & Mutch, Robert W. 1973 — Fire Management Prescriptions. A Model Plan for Wilderness Ecosystems. USDA - Forest Service

Deeming, Burgan, Cohen — The National Fire Danger Rating System-1978. Intermountain Forest & Range Experiment Station USDA-Forest Service

Finklin, A.I. 1974 — Climate of the Selway-Bitterroot Wilderness. Office Report Northern Forest Fire Laboratory, Missoula, MT

Gale, Robert D. 1977 — Evaluation of Fire Management Activities on the National Forests. Policy Analysis Staff Report, USDA - Forest Service

Mutch, Robert W. 1977 — Wilderness Fire Management Planning in Bob Marshall and Scapegoat Wilderness Fire Management Research, Development and Application Program

Reese, Mohr, Dean, Khubunde 1975 — Teton Wilderness Fire Management Plan Ecological and Resource Description of the Teton Wilderness, Teton National Forest

Stankey, G. H. 1976 — Wilderness Fire Policy. An Investigation of Knowledge and Belief. USDA Research Paper, Intermountain Forest and Range Experiment Station, Ogden, Utah

USDA Forest Service Environmental Statement 1976 — Fire Management in the Selway-Bitterroot Wilderness - A Proposed Policy Change, Bitterroot, Clearwater, Lolo and Nezperce National Forests, Northern Region

Walker, R. I. 1973 — Management Plan for the Bear Creek Fire Unit. Selway-Bitterroot Wilderness, Moose Creek Ranger District, Nezperce National Forests, Northern Region

GLOSSARY

Cardamine Constancei - Scientific name for Bittercress

Cryoplanted - frost churned

Dasynotus daubenmirei - scientific name is used as the common name

Ecological land unit (ELU) - are recognizable parcels which are ecologically equivalent in terms of their topographic features, vegetation, fuels and fire potential

Energy Release Component (ERC) - a number related to the rate of heat release (B.T.U.'s per second) per unit area (square foot) within the flowing front at the head of a moving fire.

Gextropolated - to arrive at conclusions or results by hypothesizing from known facts of observations

Fine Fuels - the complex of living and dead herbaceous plants and woody plant materials less than one-fourth inch in diameter

Fluvial landforms - land forms produced by a river

Fuel models - a simulated fuel complex for which all the fuel descriptions required for the solution of the mathematical fire spread model have been specified

Heavy fuels - fuels of large diameter such as snags, logs, and large limbwood, which ignite and are consumed more slowly than flush fuels

Holism - the view that an organic or integrated whole has a reality independent of and greater than the sum of its parts

Mitigated - moderate

Microclimate - the climate of a small, distinct area

Prescribed burning - skillful application of fire to fuels under conditions of weather, fuel moisture, soil moisture, etc., that will allow confinement of the fire to a predetermined area and at the same time will produce the intensity of heat and rate of spread required to accomplish certain planned benefits to one or more objectives of silviculture, wildlife management, and grazing. Its objective is to employ fire sicentifically to realize maximum net benefits at minimum damage and acceptable cost.

Region level of preparedness - amount of fire activity within the region or being handled by the region

Seral role - the complete series of stages occurring in succession in communities of plants and animals until climax is reached

APPENDIX A

ELU - FUEL MODEL CONVERSION CHART

1. Shrubfield - Fuel Model H (Through observed Fire Behavior using West Fork weather data)

2. PP/Savanna - Fuel Model C

   PP/DF South Slope - Fuel Model C

3. North Slope - Fuel Model G

4. Subalpine - Fuel Model H

5. Lodgepolepine - Fuel Model G

APPENDIX B

FUEL LOADINGS

The approximate tons/acre by Fuel Model in the Zones:

BAD LUCK ZONE	
Model H Shrubfield	1-3 tons/acre
Model C	10-20 tons/acre
MT. AURA ZONE	
Model H Shrubfield	1-3 tons/acre
Model G	40-60 tons/acre
LOWER WHITE CAP ZONE	
Model C	5-15 tons/acre
UPPER WHITE CAP ZONE	
Model C	15-40 tons/acre
Model G	40-80 tons/acre
Model H	40 tons/acre
SNAKE CREEK ZONE	
Model G	40-60 tons/acre
Model H	0-40 tons/acre
INDIAN CREEK ZONE	
Model C	15-40 tons/acre
Model G	40-60 tons/acre
MT. JERUSALEM ZONE	
Model G	20-45 tons/acre
Model H	0-40 tons/acre

APPENDIX C

FUEL MODEL DESCRIPTIONS

Fuel Model descriptions were taken from the National Fire Danger Rating System - 1978 Book.

Fuel Model C - Open pine stands typify Model C fuels. Perennial grasses and forbs are the primary ground fuel but there is enough needle litter and branchwood present to contribute to significantly to the fuel loading. Some brush and shrubs may be present, but they are little consequence.

Fuel Model G - Is used for dense conifer stands where there is a heavy accumulation of litter and downed woody material. Such stands are typically overmature and may also be suffering insect, disease, wind or ice damage -- natural events that create a very heavy buildup of dead material on the Forest Floor. The duff and litter are deep and much of the wood material is more than 3 inches in diameter. The undergrowth is variable, but shrubs are usually restricted to openings.

Fuel Model H - The short needled conifers are represented by Fuel Model H. In contrast to Model G fuels, Fuel Model H describes a healthy stand with sparse undergrowth and a thin layer of ground fuels. Fires in H fuels are typically slow spreading and are dangerous only in scattered areas where the downed woody material is concentrated.

APPENDIX D

FIRE MANAGEMENT PLAN

DAILY FIRE OBSERVATION REPORT

Fire Danger Rating Station: _____

1. Fire Name _____ 2. No. _____

3. Date of Obs. _____ 4. Time of Obs. _____

5. Legal _____ ¼ _____ ¼ Section _____ T _____ S _____

6. Exposure _____ 7. Position on Slope _____

8. Elevation _____ 9. Wind Direction _____

10. Wind Speed _____ 11. Size at Obs. _____

12. Smoke Volume _____ 13. Fire Behavior _____

14. Fuel Model _____ 15. Current 3-day mean E.R.C. _____

16. Fire Behavior Potential (Potential size, fuels, terrain and predicted fire weather)

_____

_____

_____

_____

_____

_____

17. Smoke Management _____

_____

_____

_____

_____

18. Fire Management Decisions _____

_____

_____

_____

_____

Observer _____

APPENDIX E

WILDLIFE

This is a native population of sheep, one of the few remaining in Montana and Idaho that has not been influenced by transplanted animals. Bob Klaver, University of Montana (unpublished thesis), studied this herd of bighorn sheep in the Selway Bitterroot Wilderness and has mapped their migration route.

Klaver cites Geist (1971) in commenting that sheep generally do not enter timber more than about ½ mile, but that they may migrate through miles of forested terrain. This apparent contradiction is explained on the basis that the area, following glaciation, was probably grassland. Due to climatic changes, forested areas have developed resulting in a patchy, discontinuous distribution of grassland. Sheep once ranged the continuous grassland and now retain the tradition of migrating through the timber to the various extant patches. Klaver's experience in following sheep trails has been that the animals definitely selected for the less dense stands of timber and for forest opening.

A positive effect of fire was observed by Klaver in his study when he observed the sheep in the Schofield Ridge Burn (1973) for three to four years afterwards. A fire would open up more grasslands for the sheep in both their summer and winter range. More positive effects are expected than any possible negative effects.

APPENDIX F

VISITOR USE DAYS

TRAIL NAME	SUMMER SEASON	FALL SEASON
White Cap	670	900
Indian Ridge	50	200
Boulder Creek	500	450
Tincup Creek	100	30
Watchtower	300	300
Nez Perce Pass	150	400
Kit Carson	150	300
Deep Creek	200	300
Selway River	500	800

APPENDIX G

FISHERIES AND WATERSHED

The major creeks in the Bad Luck Zone are Gardiner and North Star Creeks which flow into the Selway River. Steelhead have been seen approximately two miles up North Star Creek and about one mile up Gardiner Creek. Indian and Canyon Creeks are the largest streams in the Indian-Canyon Creek Area. They are natural fisheries for cutthroat, steelhead, and salmon. The Idaho Fish and Game Department has a salmon hatching channel at the mouth of Indian Creek outside the Selway Bitterroot Wilderness boundary. It was installed to re-establish the salmon run that was greatly reduced by the construction of large dams along the Columbia River system. The hatching channel is manmade with water regulation gates. Results of egg plants are displayed on the following table:

FALL	EGGS PLANTED	SPRING	FRY EMERGENCE	% HATCHING SUCCESS
1967	998 M	1968	743 M	74
1968	2700 M	1969	1272 M	64
1969	1986 M	1970	---	--
1970	3275 M	1971	917 M	28
1971	1623 M	1972	575 M	28
1972	2800 M	1973	1642 M	58
1973	202 M	1974	962 M	48
1974	2207 M	1975	914 M	41
1975	2407 M	1976	352 M	15
1976	1613 M	1977	724 M	45
1977	2700 M			

The granitic rocks in this portion of the Selway Bitterroot Wilderness produce low mineral contact in waters flowing in their influence; however, they do provide good spawning substrates. The Clearwater River drainage of which the Selway is part is important nationally for its anadromous fishery. However, the major streams in the two proposed areas are not fished any appreciable amount.

The Idaho Fish and Game officials (Walt Brown, Sam McNeal and Steve Hoss) at a meeting in Lewiston, Idaho, with Dean Byrne and Bill Frost on March 30, 1976, stated that fire within management plan area would not affect the fisheries in the area.

Several alpine lakes occur near the Bitterroot Crest in the Indian-Canyon Area. Canyon Lake is the largest and the only one with a name. During the summer of 1976, Canyon and three other lakes in the Canyon Creek Drainage were surveyed by Terry Petersen. These surveys are on file at the West Fork Ranger District office under 2530 Hydrological Surveys and are permanent records.

Legal descriptions of the lakes are:

Canyon Lake - SE¼, Section 12, T29N, R16E, B.M.
Canyon #5 - SE½, Section 16, T29N, R16E, B.M.
Canyon #15 - SE, Section 36, T29N, R17E, B.M.
Canyon #16 - NE of NW¼, Section 36, T30N, R16E, B.M.

Methyl Orange alkalinity ranged from 0 to 1, an expected condition of mountain lakes in granite rock formations. On the basis of these low alkalinity readings, aquatic productivity in terms of pounds of fish produced per acre is not high. Dissolved oxygen readings indicate high saturation and therefore favorable conditions for fish. Temperatures are well within favorable limits for trout. All lakes have sufficient area over 20 feet deep to allow fish to winter over.

Canyon Lake has no spawning areas. No fish were seen feeding either in the morning or evening, and none were caught.

Canyon #5 has no spawning potential, no observed inlet or outlet. Cutthroat and rainbow trout, 10" to 15" were caught. Some of the eggs were being resorbed.

Canyon #15 has spawning potential at the inlet. Abundant small (3" - 6"+) cutthroat were observed; the fish caught were snakey and starving.

Canyon #16 has some spawning gravel at the principal inlet. No fish were caught, one snakey 20" golden trout was seen.

APPENDIX H

ANALYSIS OF FIRES OCCURRING IN GARDINER & MT. AURA
AREAS FROM 1931 THROUGH 1977

TOTAL FIRES: 102 LIGHTNING: 101 MAN-CAUSED: 1
CLASS A: 80 CLASS B: 22 CLASS C-0 CLASS D-0

By Month: May 1 A and 1B; June 10 A's and 2B's; July 33A's and 5 B's; August 33 A's and 10 B's, September 3 A's and 4 B's
Lightning caused 101 of the 102 fires. The other 1 was a hunter smoker fire.

Fires in the study area occurred in the 5 months from May to September.

Most of the fires occurred in July and August. There is a tendency for midseason fires to become larger than early or late season fires, as illustrated below.

MONTH	CLASS A	CLASS B	CLASS C	CLASS D
May	1%	4%		
June	13%	9%		
July	41%	23%		
August	41%	46%		
September	4%	18%		

Fire occurrence ranged from a high of 17 fires in 1961, 8 fires in 1958 and 7 in 1936. There were 14 years that didn't have any fires. The average number of fires in the area for 47 years was 2.2 per year. In 34 of the years or 72% there were 2 fires or less. In 12 of the years, or 26%, there were from 3 to 8 fires. In 1 of the 47 years or 2%, there were 17 fires.

The latest fire occurrence for the study period was one fire on September 22, 1966, man-caused; Class B, 4 acres.

A total of 17 fires occurred in 1961, 16 of them in the month of August and 11 fires on the same day.

PERCENT OF ALL FIRES OCCURRING AT THIS LEVEL	CLASS A	CLASS B	CLASS C	CLASS D
3,000 - 3,999 - 5%	4%	9%	0%	0%
4,000 - 4,999 - 32%	31%	36%	0%	0%
5,000 - 5,999 - 34%	36%	27%	0%	0%
6,000 - 6,999 - 23%	23%	23%	0%	0%
7,000 - 8,000 - 6%	6%	5%	0%	0%

After evaluating the time from origin to discovery, we arrived at the following table:

TIME FROM ORIGIN TO DISCOVERY	PERCENT OF ALL FIRES	PERCENT CLASS A	B	C	D
0 - 2 hours	51%	59%	23%		
2 - 4 hours	11%	6%	27%		
4 - 8 hours	5%	6%	0%		
8 - 24 hours	16%	20%	5%		
24 - 48 hours	9%	6%	18%		
48+ hours	8%	3%	27%		

Following is the table establishing position on slope:

UPPER THIRD	MIDDLE THIRD	LOWER THIRD	RIDGETOP	VALLEY BOTTOM
16%	32%	3%	41%	8%
16	33	3	42	8

A comparison of the exposure fires occurred on.

EXPOSURE	PERCENT OF ALL FIRES	PERCENT OF A FIRES	PERCENT OF B FIRES
N	10%	13%	0%
NE	9%	11%	0%
NW	6%	5%+	9%
S	23%	20%	35%
SE	15%	15%	17%
SW	15%	13%	22%
E	10%	13%	0%
W	12%	10%	17%

Evaluation of steepness of slope in relation to fire size.

SLOPE	ALL FIRES	CLASS A	B	C & LARGER
0 - 20%	11%	11%	9%	
21 - 40%	22%	23%	18%	
41 - 60%	29%	24%	50%	
61 - 80%	25%	27%	18%	
81+ %	13%	15%	5%	

APPENDIX I

ANALYSIS OF FIRES OCCURRING IN WATCHTOWER & BOULDER CREEK AREAS FROM 1931 THROUGH 1977 - 40 FIRES

TOTAL FIRES: 40 LIGHTNING: 37 MAN-CAUSED: 3
CLASS A: 30 CLASS B: 8 CLASS C: 3

By month: July 13 A's, 2 B's and 1 C; August 16 A's, 6 B's and 1 c: September 1 C

Lightning caused 37 of the 40 fires, 93%. Of the other three fires, all were caused from smoking, giving a total of 7% man-caused.

Fires in the study area occurred in the 3 months from July to September. All the fires occurred in July and August except 1 in September and it was a Class C.

MONTH	CLASS A	CLASS B	CLASS C
July	45%	25%	33 1/3%
August	55%	75%	33 1/3%
September	0%	0%	33 1/3%

Fire occurrence ranged from a high of 5 fires in 1961, then 3 fires in the years 1931, 1957 and 1967. The average number of fires for the 47 years was .8.

The latest fire occurrence for the study period was September 8, 1942, lightning caused, Class C, 36 acres.

A total of 5 fires occurred in 1961 and 1 in July and 4 in August which 3 of these were on the same day, 4 were Class A and 1 Class B. 4 occurred at 8000' and the other at 6500'.

The 3 class C fies in the 47 years occurred on 9-8-42, 36 acres at 7000'; 1 on 7-28-57, 55 acres at 7500'; and the 3-one on 8-11-67, 13 acres at 7500'.

PERCENT OF ALL FIRES OCCURRING AT THIS LEVEL		CLASS A	CLASS B	CLASS C
4000 - 5000	12%	10%	25%	0%
5001 - 6000	22%	28%	13%	0%
6001 - 7000	27%	31%	12%	33%
7001 - 8000	37%	31%	38%	67%
8000 +	2%	0%	12%	0%
Number of Fires:	40	29	8	3

TIME FROM ORIGIN TO DISCOVERY	PERCENT OF ALL FIRES	CLASS A	B	C
0 - 2 hours	40%	45%	25%	33 1/3%
2 - 4 hours	5 %	7%	0%	0 %
4 - 8 hours	18%	21%	13%	0 %
8 - 24 hours	17%	14%	25%	33 1/3%
24 - 48 hours	13%	10%	12%	33 1/3%
48 + hours				

PERCENT OF SLOPE

UPPER THIRD	MIDDLE THIRD	LOWER THIRD	RIDGETOP	VALLEY BOTTOM
18%	25%	10%	42%	5%
7 Fires	10 Fires	4 Fires	17 Fires	2 Fires

A comparison of the exposure fires occurred on:

EXPOSURE	PERCENT OF ALL FIRES	PERCENT OF A&B FIRES	PERCENT OF C FIRES
N	5%	5%	
NE	3%	3%	
NW	0%	0%	
S	37%	41%	
SE	20%	19%	33 1/3%
SW	15%	13%	33 1/3%
E	12%	11%	33 1/3%
W	8%	8%	

Evaluation of steepness of slope in relation to fire size:

SLOPE	ALL FIRES	CLASS A	B	C
0 - 20%	23%	21%+	37%	
21 - 40%	20%	17%	38%	
41 - 60%	17%	14%	25%	33 1/3%
61 - 80%	17%	20%	0%	33 1/3%
81%	23%	28%	0%	33 1/3%

APPENDIX J

October 1, 1974

ANALYSIS OF FIRES OCCURRING IN INDIAN CREEK AND
COOPER CREEK AREAS FROM 1929 THROUGH 1973 - 172 FIRES

Total Fires - 172 Lightning - 169 Man-Caused - 3

Class A - 123 Class B - 41 Class C - 7 Class D - 1 = 172

By Month: June, 4 A's; July, 54 A's, 11 B's, 3 C's; August, 59 A's, 19 B's, 1 C, and 1 D; September, 5 A's, 11 B's, 3 C's.

Lightning caused 169 of the 172 fires, or 98.3 percent. Of the other three fires: one hunter warming fire, one from blasting, and one campfire, giving a total of 1.7 percent man-caused.

Fires in the study area occurred in the 5 months from June to October. Most of the fires occurred in July and August. There is a tendency for midseason fires to become larger than early or late season fires as illustrated below:

Month	Class A	Class B	Class C	Class D
June	3%	0%	0%	0%
July	44%	27%	43%	0%
August	48%	46%	14%	100%
September	4%	27%	43%	0%
October	1%	0%	0%	0%

Fire occurrence ranged from a high of 12 fires respectively in the years 1934 and 1953 to 5 years in which there were no fires (1930, 1931, 1946, 1950, and 1965) in the study area. The average number of fires in the area for the 44 years was 3.9. Analysis of the number of fires by individual years indicates the following: in 20 of the 44 years (45%) there were two fires or less; in 21 of the 44 years (48%) there were from three to eight fires; in 3 of the 44 years (7%) there were from nine to twelve fires.

The latest fire occurrence for the study period was one fire October 8, 1943; lightning-caused; Class A.

A total of 11 fires occurred in 1940, all in the month of July, with six fires occurring on the same day (July 4). The greatest number of fires occurred at the 7,000-foot elevation (67) and the largest fire at 7,000 feet (Class D, lightning-caused, Schofield fire, 8/13/73, burned a total of 155 acres).

Percent of all Fires Occurring at this Level		Class A	Class B	Class C	Class D
3,000-4,000	1%	1%	0%	0%	0%
4,000-5,000	7%	9%	2%	0%	0%
5,000-6,000	12%	12%	7%	29%	0%
6,000-7,000	31%	28%	42%	42%	0%
7,000-8,000	39%	40%	37%	29%	100%
8,000+	10%	10%	12%	0%	0%
Number Fires	172	123	41	7	1

After evaluating the time from origin to discovery, we arrived at the following table, although it must be noted that we only had data for 165 fires out of the total of 172:

Time from Origin to Discovery	Percent of All Fires	Percent Class A	Percent Class B	Percent Class C	Percent Class D
0- 2 hours	40%	70%	24%	6%	0%
2- 4 hours	11%	79%	21%	0%	0%
4- 8 hours	6%	60%	20%	10%	10%
8-24 hours	17%	68%	32%	0%	0%
24-48 hours	10%	63%	31%	6%	0%
48+ hours	16%	65%	31%	4%	0%

We were unable to establish the position on slope of 18 fires due to information not furnished, although we came up with the following table of percentages for the remaining 154 fires:

Percent of Slope				
Upper 1/3	Middle 1/3	Lower 1/3	Ridgetop	Valley Bottom
37%	37%	6%	17%	3%
57 fires	57 fires	10 fires	26 fires	4 fires

A comparison of the exposure fires occurrs in the following (information was available for 166 fires only out of 172 total):

Exposure	Percent of All Fires	Percent of A and B Fires	Percent of C and Larger Fires
N	14%	96%	4%
NE	8%	100%	0%
NW	10%	94%	6%
S	26%	93%	7%
SE	8%	93%	7%
SW	10%	100%	0%
E	11%	94%	6%
W	13%	95%	5%

Evaluation of steepness of slope in relation to fire size:

Slope	All Fires	Class A	Class B	Class C & Larger
0-20%	17%	22%	5%	0%
21-40%	32%	35%	24%	37%
41-60%	23%	17%	39%	25%
61-80%	16%	15%	15%	25%
81%+	12%	11%	17%	13%

APPENDIX K

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Bitterroot NF

REPLY TO: 2530 Hydrologic Surveys, Prescriptions, & Plans
2320 Wilderness

March 10, 1978

SUBJECT: Selway-Bitterroot Wilderness Fire Management
Watershed Comments

TO: District Ranger, West Fork RD
Bill Frost

This brief note responds to your request for a letter commenting on possible hydrologic effects of implementing some form of fire management program in the Selway-Bitterroot Wilderness portion of Ravalli County from North Fork Sheephead Creek to Trapper Peak. Comments herein are necessarily very general and are based on a very brief look at color IR aerial photos.

Possible effects of a fire on a watershed depend on intensity and location of fire, particularly with respect to proximity of water bodies and land or soil stability. Norm Davis' letter of February 14, 1978, discusses the general soil erosion potential from hot burn areas.

The Bitterroot Range is an efficient or "flashy" watershed, meaning that a major portion of precipitation becomes streamflow in rather short time. Water quality is very high, hard granitic rocks producing very little dissolved load and relatively-small sediment loads. The high precipitation, short cool growing season, and rocky steep slopes produce relatively sparse vegetation.

Destruction of vegetation by fire may produce increased soil moisture and increased streamflow from the denuded area. Glacier-scoured granitic bedrock and glacial debris are covered with vegetation on perhaps one third to one half the area at most. Most of the area is of southerly aspect and very shallow and rocky soils. Consequently streamflow increases following fire are apt to be small, if not undetectable. Snowmelt runoff would usually be advanced following a fire; the "flashy" nature of runoff from small watersheds may be slightly enhanced.

Channel degradation from vegetative removal by fire is unlikely in other than very localized, very small tributary headwaters. Bitterroot Range stream channels tend to be relatively stable, being formed of bedrock and large alluvial and glacial rock debris. In general, there is inadequate continuous vegetation and lack of sufficient soil moisture storage to create significant streamflow increases which would degrade third order and larger streams.

Low flows during late summer, which are important to local irrigation, would not be affected by expected fires in the Bitterroot Range. Snowmelt fed flows may be increased and may occur somewhat earlier in localized headwater tributaries. The small flow increases possible with fire would thus occur at a time of water surpluses of little use for irrigation, but decreases later in the season would not be expected.

Destruction of soils probably has the greatest potential to yield water degradation by fire. Increased sedimentation, both inorganic and organic, and increased stream nutrient inputs may be expected following fire. Reduced infiltration capacity, particularly of finer textured soils such as the loess caps, may result from fire and lead to enhanced overland flow with erosion and sedimentation. In general, areas with loess cap soils will be most susceptible to fire damage (see Davis' letter).

Fire along stream bottoms should be carefully considered since fuel accumulations are often greatest therein, and water is immediately proximate to shade removal with resultant stream temperature increases, sediment introduction, and input of ash, organic debris, and nutrients. Downed trees and other debris may physically alter channels. The wetness of streamside areas and the dominance of rapidly sprouting shrubs may largely offset fire damage in stream bottoms. Certainly, however, the infrequent intense burn which might burn off the relatively deep organic layers of stream bottom soils could impact water quality dramatically.

Another concern in steep alpine country with heavy snowpacks is snow and earth avalanches. Forest fires may accelerate avalanching of steep slopes. Slide paths may increase in size and numbers following fire, and those paths reaching streams may contribute to channel instability.

In conclusion, I believe that fire in an area, such as North Sheephead to Trapper Peak, can cause acceptable watershed and water degradation, which will usually be very localized, microsite effects. Consider too, that natural water quality, in terms of hundreds of years, includes periodic degradation from wildfire.

Robert G. Hammer

ROBERT G. HAMMER
Hydrologist

cc: Hammer

APPENDIX L

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Bitterroot NF

REPLY TO: 2320 Wilderness February 14, 1978

SUBJECT: Wilderness Fire Management - Selway-Bitterroot

TO: District Ranger, West Fork RD
Attn: Bill Frost

In response to your questions on soils, I took a quick look at soils and landforms through studying 1975 infrared photos of the portion of the Selway-Bitterroot Wilderness within Ravalli County from North Fork Sheephead Creek to Trapper Peak. My observations are:

The description "(a) strongly glaciated lands (granitic)", page 10 of Environmental Statement R1-76-12, describes this area very well.

Soil Erosion Potential from Hot Burn Areas - There are some areas where accelerated erosion can be expected to occur should they receive a hot burn. These are mostly the very strongly frost churned areas with AF/Luhi-vase, AF/Xeta and whitebark pine-subalpine fir habitat types. Soils are very thin (<12") with 1 to 3 inches of loess surface layer. These areas are above those affected by glaciation. The total area is estimated to be 1200 acres with contiguous areas ranging from 100 to 400 acres. They are located in sec. 6, T. 28 N., R. 23 W., sec. 35, T. 29 N., R. 23 W., and sec. 17, T. 29 N., R. 22 W. A good example of a burn on this type area is just SW of Nelson Lake in sec. 17. The impact would mostly be on site. Loss of up to 1 inch of soil may occur and will result in degrading the productivity of the area for growing vegetation. The severe climate and very shallow soils are major factors contributing to very slow vegetative recovery. Therefore mineral soils are exposed to the erosion forces for a long period (40-60 yrs).

The other areas where erosion will accelerate should a hot burn occur is the very steep lower slopes on the glacial trough walls and glacial till deposits on valley bottoms. These are mostly cool and moist sites and are favorable for quick vegetation recovery; therefore the time at which mineral soil would be exposed to erosive forces is short (4-6 yrs). Because of their closeness to drainages and steepness of sideslopes, some soil material would end up in creeks. There is about 2000 acres total occurring in four separate areas of 300 to 600 acres in size. These are located in:

Sec. 17 and 18, T. 29 N., R. 23 W.
Sec. 15, 16, and 22, T. 29 N., R. 23 W.

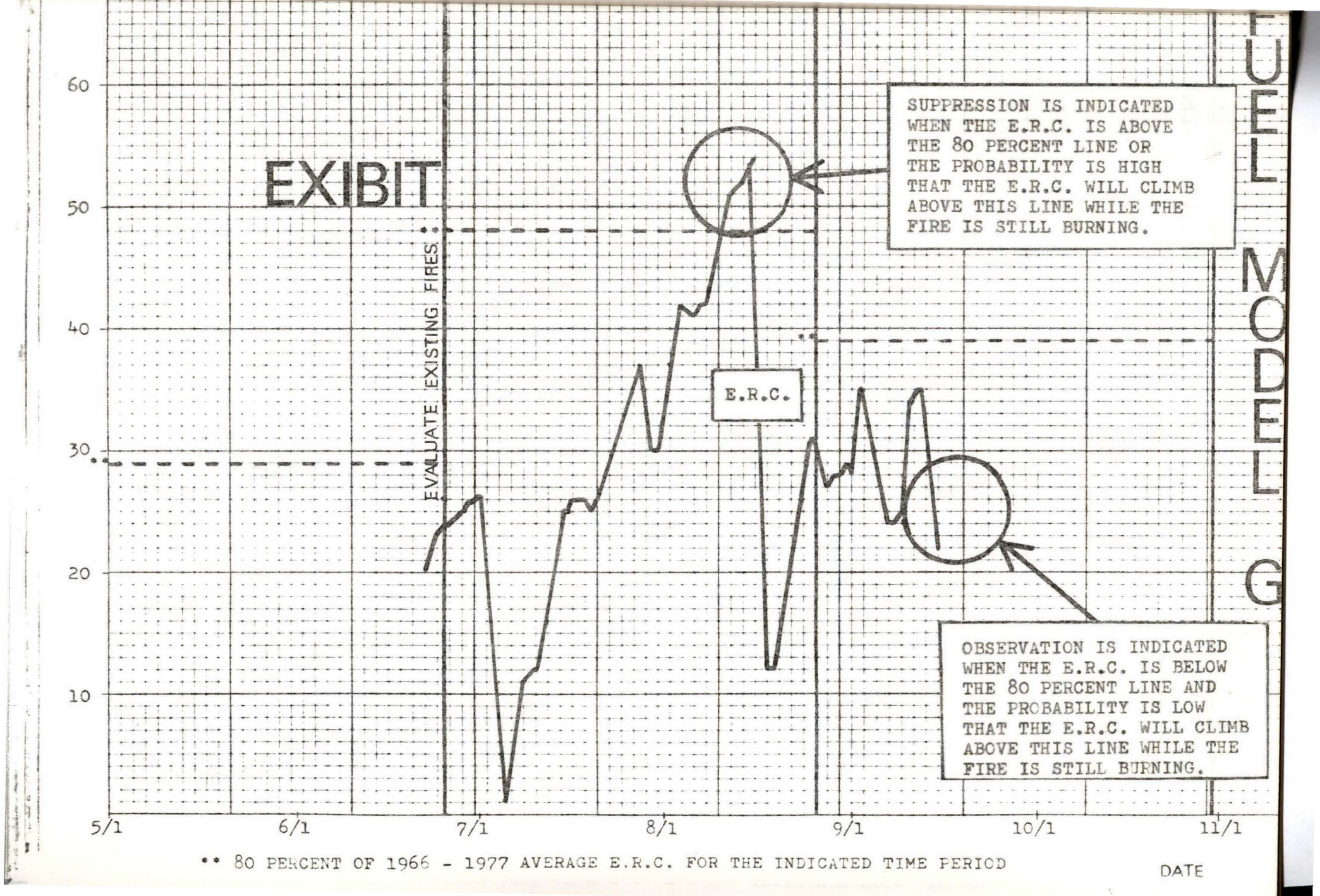
Sec. 17, T. 29 N., R. 22 W.
Sec. 4, 5, and 6, T. 28 N., R. 22 W.

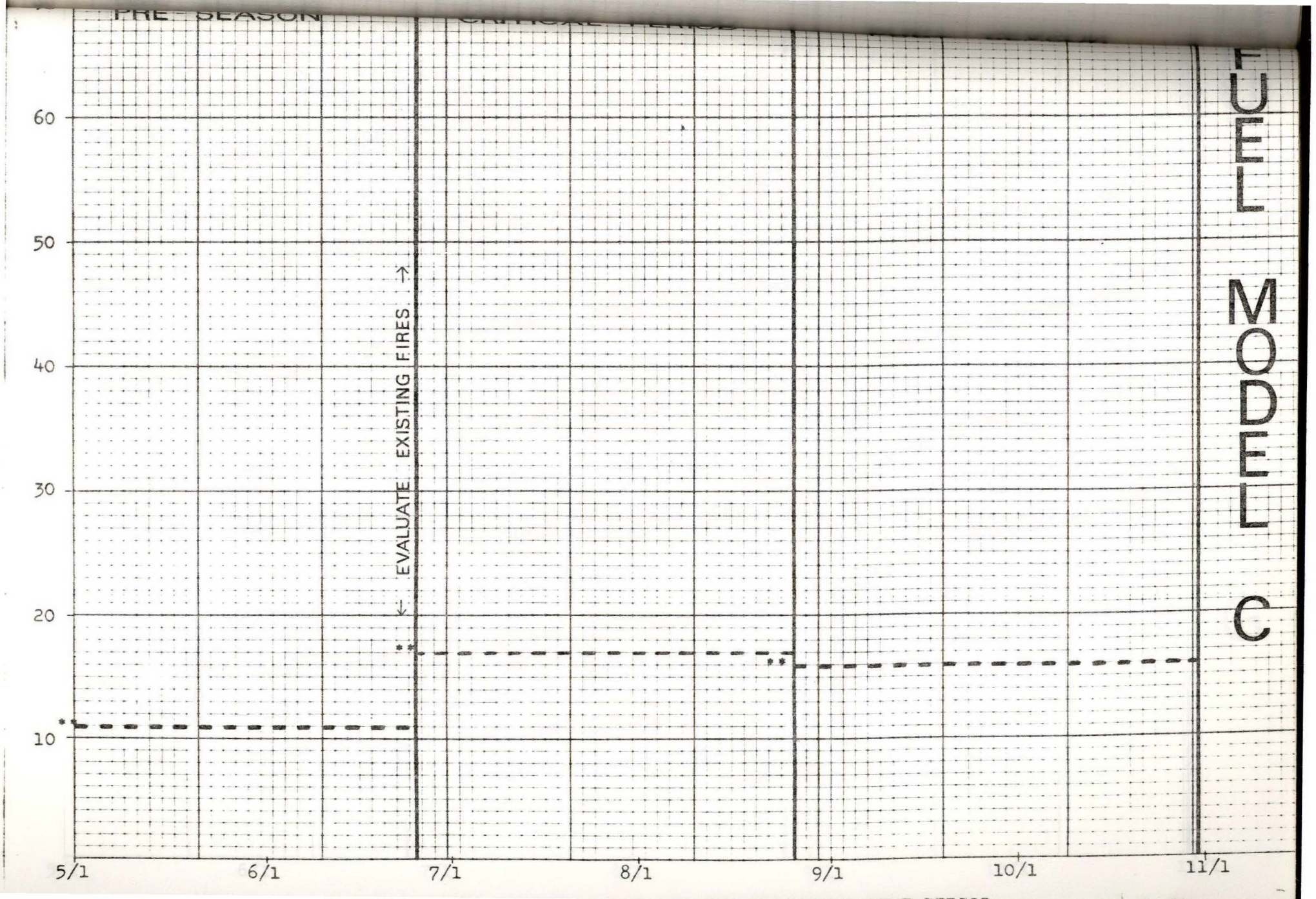
The remainder of the area is mostly rock.

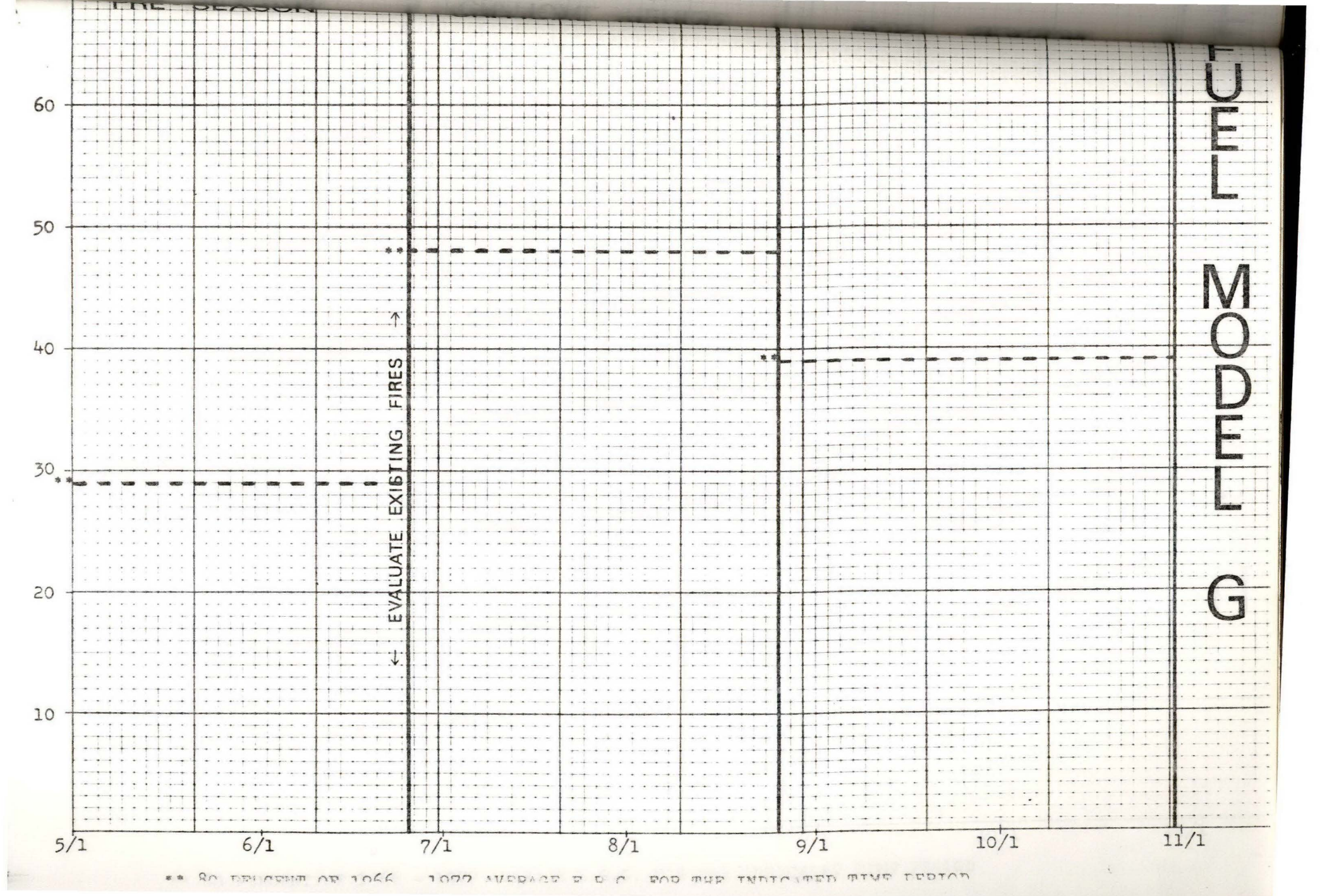
Norman M. Davis

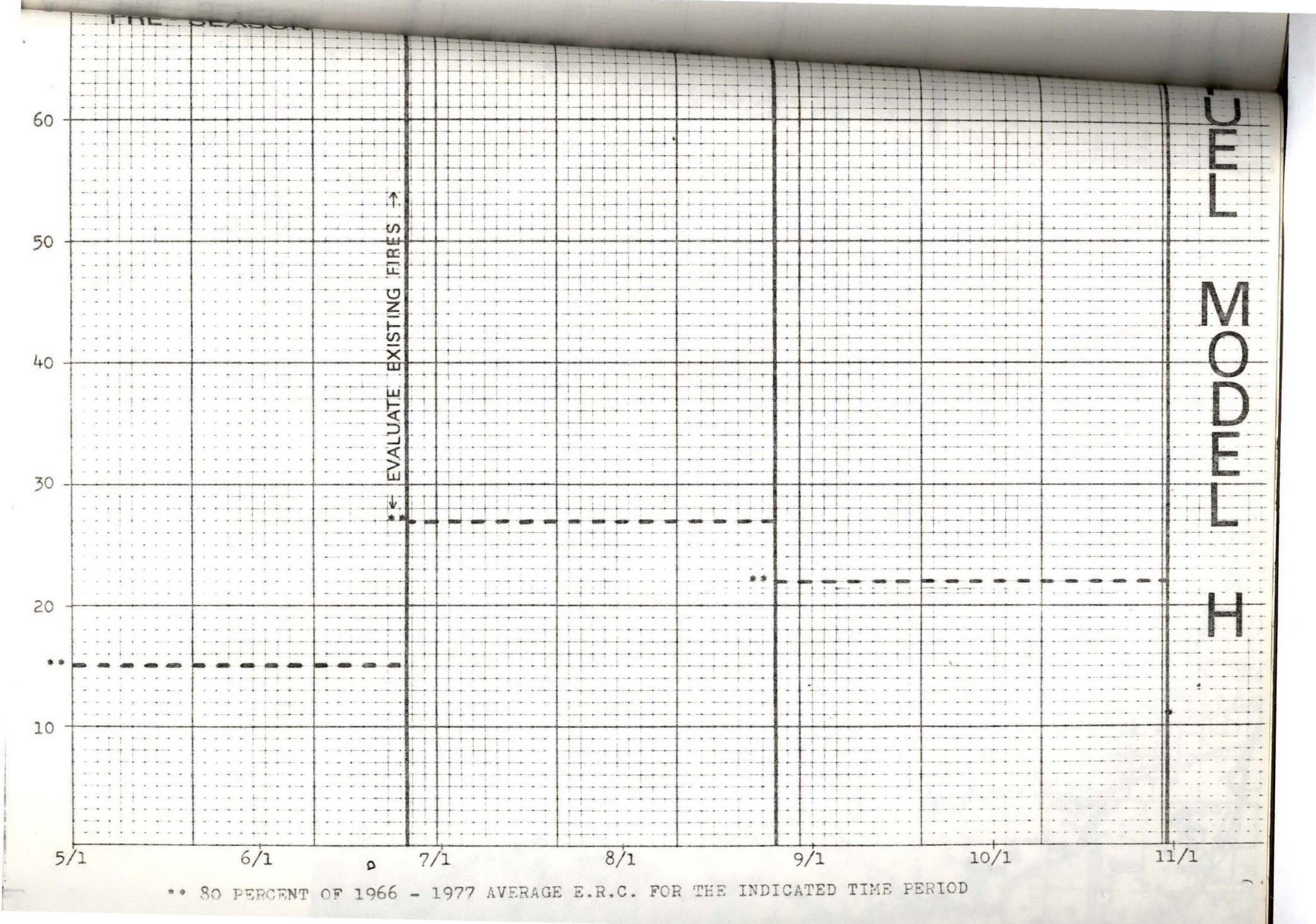
NORMAN M. DAVIS
Soils Scientist

cc: Norm Davis

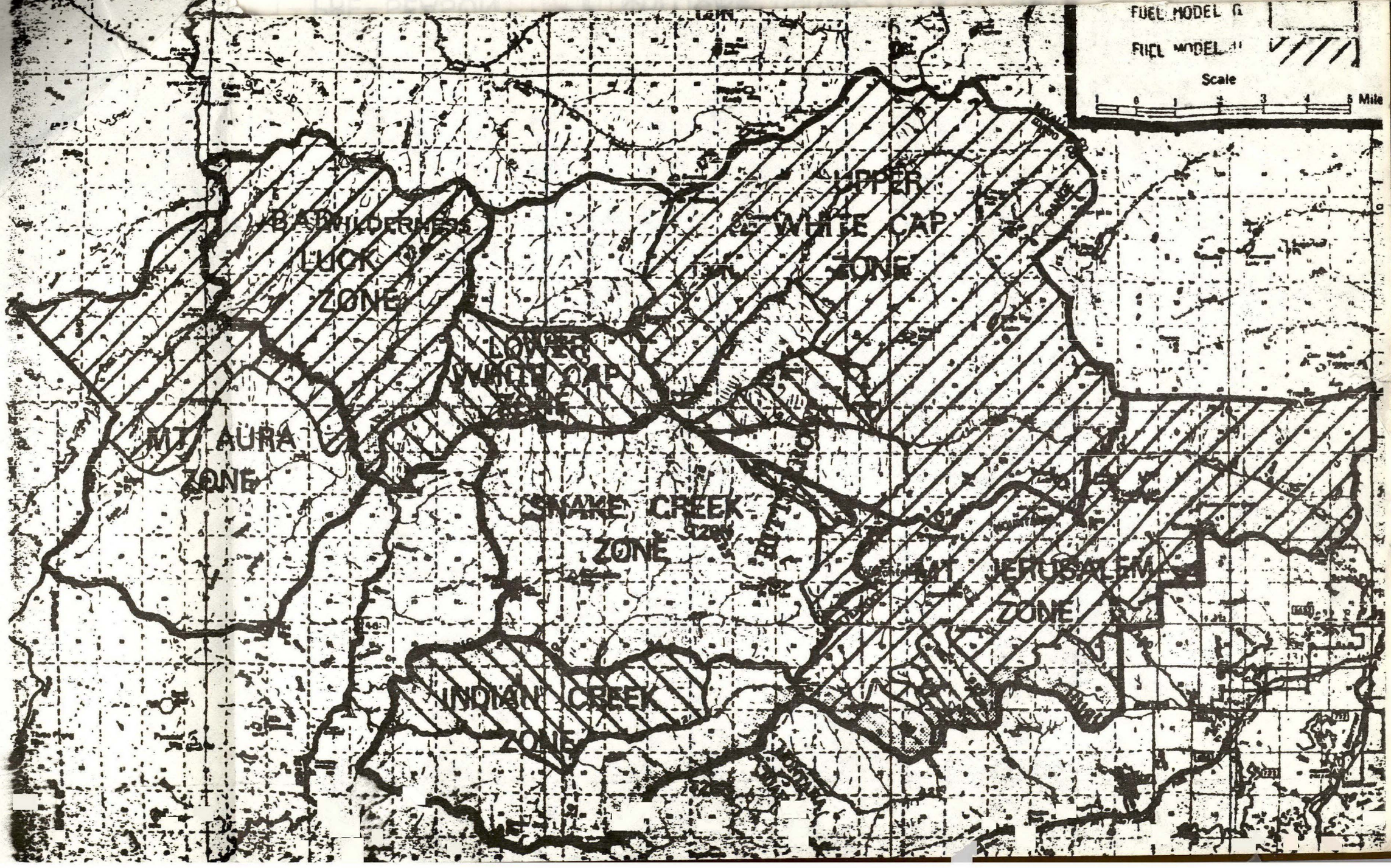

EXIBIT
FUEL MODEL G
60
50
40
30
20
10
EVALUATE EXISTING FIRES
E.R.C.
SUPPRESSION IS INDICATED WHEN THE E.R.C. IS ABOVE THE 80 PERCENT LINE OR THE PROBABILITY IS HIGH THAT THE E.R.C. WILL CLIMB ABOVE THIS LINE WHILE THE FIRE IS STILL BURNING.
OBSERVATION IS INDICATED WHEN THE E.R.C. IS BELOW THE 80 PERCENT LINE AND THE PROBABILITY IS LOW THAT THE E.R.C. WILL CLIMB ABOVE THIS LINE WHILE THE FIRE IS STILL BURNING.
5/1
6/1
7/1
8/1
9/1
10/1
11/1
** 80 PERCENT OF 1966 - 1977 AVERAGE E.R.C. FOR THE INDICATED TIME PERIOD
DATE


PRE-SEASON
CRITICAL PERIOD
← EVALUATE EXISTING FIRES →
60
50
40
30
20
10
5/1
6/1
7/1
8/1
9/1
10/1
11/1
FUEL MODEL C


FUEL MODEL G
60
50
40
30
20
10
5/1
6/1
7/1
8/1
9/1
10/1
11/1
EVALUATE EXISTING FIRES



** 80 PERCENT OF 1966 - 1977 AVERAGE E.R.C. FOR THE INDICATED TIME PERIOD


FUEL MODEL G
FUEL MODEL
Scale
0 1 2 3 4 5 Mile
ABA WILDERNESS
LUCK ZONE
UPPER WHITE CAP ZONE
LOWER WHITE CAP ZONE
MT AURA ZONE
SNAKE CREEK ZONE
MT JERUSALEM ZONE
INDIAN CREEK ZONE